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Article

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State and Local Government Employees Without Social Security Coverage: What Percentage Will Earn Pension Benefits That Fall Short of Social Security Equivalence?

by Jean-Pierre Aubry, Siyan Liu, Alicia H. Munnell, Laura D. Quinby, and Glenn R. Springstead*

Social Security is designed to provide a base of retirement income, to be supplemented in part by employer-sponsored retirement plans. However, approximately one-quarter of state and local government employees are not covered by Social Security, which federal law allows if their employer-provided plans provide comparable benefits. Yet many public pensions are less generous for recent hires, raising questions of whether those plans will still provide Social Security–equivalent benefits. Using plan actuarial reports, public-use survey data, and Social Security administrative files, we examine 66 plans and project that a significant minority of them are likely to fall short of providing Social Security–equivalent benefits, most often affecting workers who accrue medium-length tenures in state or local government early in their careers. In all, 750,000 to 1 million noncovered workers annually might be at risk of receiving pension benefits that fall short of Social Security benefit levels.

Introduction

Social Security is designed to provide a base of retirement income, to be supplemented by employer-sponsored retirement plans and individual savings. However, approximately 5 million state and local government employees are not covered by Social Security in their current job.[1] Federal law allows state and local governments to exclude these workers from Social Security coverage if they are provided with a retirement plan that will pay comparable benefits. Because promised benefits in many public pensions have declined in recent years—and a few plans might exhaust their assets—it is important to determine whether state and local government pension plans still meet the requirement to provide benefits comparable to those from Social Security.

To meet the comparability standard, the law requires defined benefit (DB) plans—as the dominant type of state and local government plan—to provide members with an annual benefit for life that is at least equal in value to the annual primary insurance amount (PIA) that members would have received had they participated in Social Security. The plan must allow members

Selected Abbreviations	
CB	cash balance
COLA	cost-of-living adjustment
CWHS	Continuous Work History Sample
DB	defined benefit
DC	defined contribution

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to begin benefits when or before they reach Social Security's full retirement age (FRA). To help state and local governments determine whether their plans comply, the federal government has established pension adequacy standards called Safe Harbor provisions.

Recent economic downturns have led to pension funding developments that have prompted questions of whether Safe Harbor guidelines continue to assure future pension adequacy for all noncovered workers. Even if plans meet the legal requirements, noncovered state and local employees still may not receive Social Security–equivalent benefits because beneficiaries face long vesting periods and may not get full cost-of-living adjustments (COLAs), despite being able to claim full benefits at a younger age than under Social Security. The broader question is whether noncovered workers receive comparable benefits when measured in terms of lifetime wealth.

Quinby, Aubry, and Munnell (2020) conducted a stylized analysis and concluded that all state and local government pension plans currently satisfy the letter of the law, but 43 percent of them will not provide lifetime Social Security–equivalent benefits for some hypothetical new hires. Specifically, some plans fall short for workers who spend 6–20 years in noncovered work before finishing their careers in covered employment.

This article builds on Quinby, Aubry, and Munnell (2020) in three ways. First, we use multiple data sets to explore the tenure pattern of teachers, public safety workers (mostly police and firefighters), and other-occupation (or "general government") state and local employees to identify the workers whose career archetypes put them at the greatest potential risk of pension shortfall. Second, we use the detailed tenure data to calibrate a model to evaluate the comparability of DB plan benefits for workers with short, medium, and long tenures. Third, we expand the analysis beyond DB plans to assess the comparability of benefits in defined contribution (DC) and hybrid DB-DC plans for noncovered workers. Together, these three analyses provide the most comprehensive projections to date of benefit adequacy for noncovered workers.

In the discussion that follows, the first section provides background information on noncovered state and local government workers. The second section summarizes Quinby, Aubry, and Munnell (2020), the initial effort to study the extent to which noncovered workers might not receive benefits comparable to Social Security. The third section provides information on the tenure patterns of state and local government workers. The fourth section describes the methodology of our comprehensive analysis, which uses a synthetic population of noncovered workers, then presents the results. The fifth section concludes, with a finding that ultimately, 16 percent of the noncovered workforce—representing between 750,000 and 1 million individuals annually—could be at risk of receiving less in lifetime pension benefits than Social Security provides.

Background

The Social Security Act of 1935 excluded state and local government employees from Social Security coverage because of constitutional ambiguity over the federal government's authority to impose payroll taxes on public-sector employers and because these employees were already covered by DB pensions (Nuschler 2021). Beginning in the 1950s, a series of amendments were enacted that allowed state and local governments to enroll certain categories of employees in Social Security. By 1991, over 75 percent of them were covered by the program. Today, public-sector employees are permitted to remain outside of Social Security if their employer-provided retirement plans meet Internal Revenue Service Employment Tax Regulations, which require plan benefits to be sufficiently generous. To meet the generosity standard, a plan must provide members with an annual benefit for life that is at least equal in value to the annual PIA that members would have received had they participated in Social Security. The pensioner must be able to start benefits on or before reaching Social Security's FRA, which varies from 65 to 67 depending on the worker's year of birth.

To help providers determine whether their plans comply with the Employment Tax Regulations, the federal government established the Safe Harbor benefit adequacy guidelines. In general, a DB plan's benefits are equal to the product of the worker's average final earnings, the worker's years of service, and a multiplier called a benefit factor. The Safe Harbor formula

assumes a retirement age of 65 and sets a minimum benefit factor that varies with the number of years included in the final-earnings calculations (Table 1). For example, if the plan bases benefits on the worker's 3 years of highest earnings, it must have a benefit factor of at least 1.5 percent; if the averaging period is 5 years, the minimum benefit factor must be 1.6 percent. DC plans also have Safe Harbor guidelines, which require total employer and employee contributions to equal at least 7.5 percent of salary annually, along with asset management that meets fiduciary standards.

Despite the legal requirement that state and local government pensions match the generosity of Social Security coverage, and the importance of pension benefits to the retirement income of those workers, their sufficiency remains largely undiscussed. Because some state and local governments have recently enacted pension plan reductions, the future benefits that newly hired employees will ultimately receive may not satisfy the Safe Harbor requirements or the Employment Tax Regulations. Moreover, years of inadequate contributions and two stock market downturns have left the assets of many public-sector DB plans insufficient to cover liabilities (Brown and Wilcox 2009; Novy-Marx and Rauh 2014; Aubry, Crawford, and Munnell 2017).[2] For a scenario in which sponsors exhaust the assets in their pension trust funds and convert to pay-as-you-go systems, legal scholars question whether state legislatures could be forced to pay promised benefits in full (Monahan 2010, 2017; Cloud 2011; Reinke 2011). The federal generosity standards make no provision for an exhaustion scenario.

A First Look at Whether Benefits Meet Federal Standards

Quinby, Aubry, and Munnell (2020)—hereafter, "the 2020 study"—investigated pension adequacy for noncovered workers with three aims. The first was to assess whether retirement benefits for noncovered workers meet the Safe Harbor requirements for DB plans. The second was to assess whether plans that meet the Safe Harbor criteria produce monthly retirement benefits at age 67 that are equivalent to the Social Security PIA (in other words, to confirm that the Safe Harbor guidelines still accurately predict future Social Security benefits). The third was to extend the analysis of the adequacy of plan benefits by projecting whether noncovered workers will receive Social Security–equivalent resources *throughout* retirement. We summarize the results below.

Do Pension Benefits for Noncovered Workers Meet Safe Harbor Requirements?

Quinby, Aubry, and Munnell collected data on Social Security coverage from surveys of plan administrators in a sample of states and from the plans' actuarial valuation reports.[3] Table 2 shows the Social Security coverage rate of state and local government workers in each of those states. Social Security coverage in the surveyed states varied significantly by occupation; although most teachers in these states lack Social Security coverage, only one-third of workers in general government occupations are not covered (Chart 1).

The review of actuarial reports produced information on the normal retirement ages (NRAs) and the benefit computation formulas for new hires in plans

Table 1.
Safe Harbor minimum benefit factors for DB pension plans, by basis for calculating final average salary

Basis	Benefit factor (%)
Highest—	
3 years	1.50
4 years	1.55
5 years	1.60
6–10 years	1.75
More than 10 years	2.00

SOURCE: Internal Revenue Service Revenue Procedure 91-40.

NOTE: DB plans typically calculate benefits as final average salary times years of noncovered employment times the benefit factor.

Table 2.
Percentage of state and local government employees not covered by Social Security in selected states

State	Noncovered
California	42
Colorado	76
Connecticut	64
Georgia	22
Illinois	42
Kentucky	29
Louisiana	87
Massachusetts	100
Missouri	20
Nevada	100
Ohio	100
Texas	35

SOURCE: Quinby, Aubry, and Munnell (2020, Table 2).

Chart 1.
Percentage of state and local government employees in noncovered employment, by occupational group, 2018

Percent
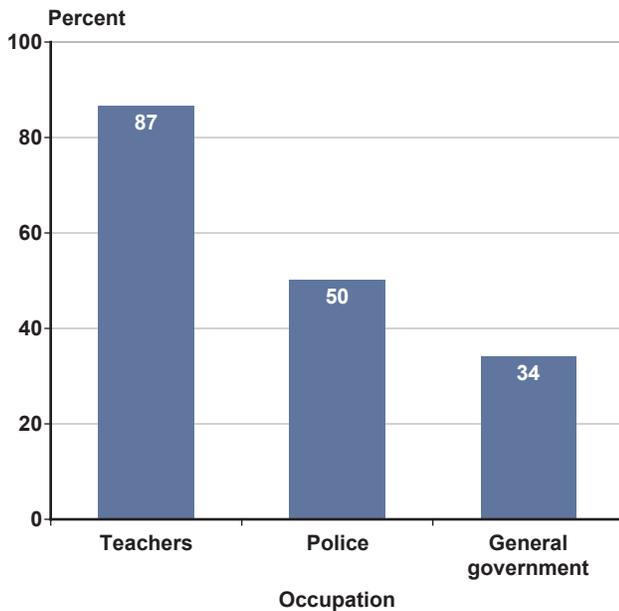
SOURCE: Quinby, Aubry, and Munnell (2020, Chart 1).

for noncovered workers. Although the NRA in a few plans was older than the Safe Harbor benchmark of 65, no plan's NRA exceeded the Social Security FRA and many were substantially younger: The median NRA was 62. Similarly, the benefit formula was typically more generous than required by law. For example, among plans that use a 3-year final average salary (FAS) period to compute benefits, the median benefit factor is 3.0 percent, whereas the Safe Harbor formula requires only 1.5 percent (Table 3).[4] In short, the future benefits of noncovered new hires in state and local government appear to satisfy the Safe Harbor requirements.

Are Safe Harbor–Compliant Plans Adequate?

To see whether the Safe Harbor formulas accurately determine whether annual pension benefits at age 67 are equivalent to the annualized Social Security PIA, the 2020 study compared the benefits a state or local government worker would receive under two scenarios. In the first scenario, the worker splits her or his career between covered and noncovered work and receives benefits from both a Safe Harbor–compliant DB plan and Social Security. In the second scenario, the years worked and annual earnings are identical to those in

Table 3.
Characteristics of benefit formulas offered to noncovered state and local government new hires in 2016

Characteristic	Number of benefit formulas	Mean	Median	Minimum	Maximum	Safe Harbor requirement
		DB plan formulas				
NRA	. . .	62	62	50	67	65
Benefit factor (%) in formulas that calculate FAS for a period of—						
1 year	1	3	3	3	3	1.50
2 years	1	2	2	2	2	1.50
3 years	22	2	3	1	3	1.50
5 years	33	2	3	2	3	1.60
6–10 years	8	2	2	2	3	1.75
		DC plan formulas [a]				
Combined employer and employee contribution rate (%)	10	17.4	18.0	10.0	23.5	7.50

SOURCE: Quinby, Aubry, and Munnell (2020, Table 3)

NOTES: Some retirement plans feature complicated design aspects, such as benefit multipliers that vary based on tenure, which have been simplified to reflect the experience of most employees.

. . . = not applicable.

a. Includes hybrid and cash-balance plans.

the first scenario, but this worker's career consists entirely of covered employment and she or he receives Social Security benefits only. The benefit calculations for the Safe Harbor–compliant plans assume a 1.5-percent benefit factor, a 3-year FAS period, an NRA of 65, and no COLA. Because Safe Harbor regulations do not stipulate a vesting requirement, the 2020 study's authors assumed immediate vesting.[5]

Chart 2 compares total annual benefit payments at age 67 from the two scenarios. It shows that the number of years worked in noncovered employment has little effect on age-67 benefits. That is, the scenario that combines a Safe Harbor–compliant pension with some Social Security (the solid red line) produces roughly the same total annual benefit payment at age 67 as the scenario with continuous Social Security coverage (the dashed blue line), regardless of the worker's tenure in noncovered employment.

Do Noncovered Workers Get Equivalent Lifetime Benefits?

Although the plans for noncovered public-sector employees satisfy the Safe Harbor requirements and the Safe Harbor provisions achieve the goal of the Employment Tax Regulations, it is still not clear that the noncovered employees enjoy Social Security–equivalent resources *throughout* retirement.

Public pensions and Social Security differ in important ways that affect lifetime retirement resources. For example, many state and local government plans have very long vesting periods[6] and in recent years have been increasingly unlikely to grant full COLAs after retirement. However, they also tend to allow members to collect full benefits at much younger ages than Social Security does.

Incorporating these factors into the generosity test requires a conceptual transition from annual benefits at age 67 to lifetime retirement wealth. The 2020 study's authors calculated the following ratio:

$$\frac{\textit{Noncovered pension wealth} + \textit{Covered Social Security wealth}}{\textit{Counterfactual Social Security wealth}}$$

Noncovered pension wealth is the present value of future state and local government pension benefits from noncovered employment; covered Social Security wealth is the present value of Social Security benefits earned from covered employment (in either the public or private sector); and counterfactual Social Security wealth equals the present value of the Social Security benefits that the worker *would have received* had she or he spent a full career in covered employment. If this "counterfactual wealth ratio" is less than 1, the worker would have been better off never entering noncovered employment. The results are presented in Chart 3, which shows that 43 percent

Chart 2.
Estimated annuitized retirement benefit that combines some Social Security and some Safe Harbor–compliant pension coverage for a hypothetical 2018 labor force entrant aged 25, by number of years in noncovered employment
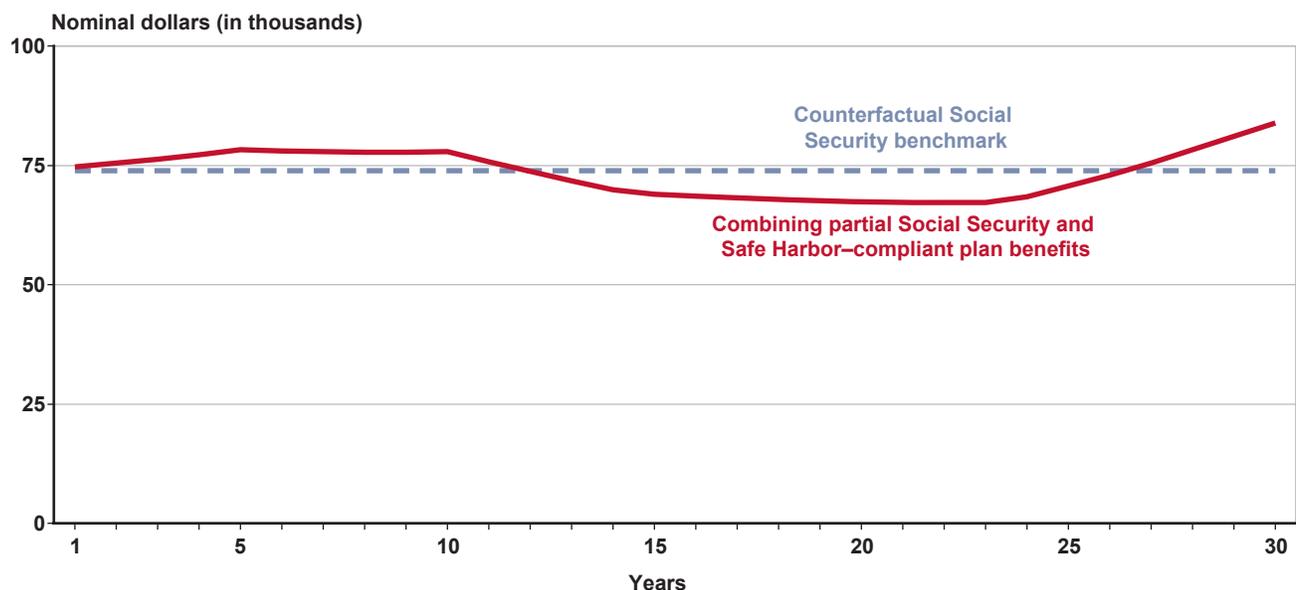
SOURCE: Quinby, Aubry, and Munnell (2020, Chart 3).

Chart 3.
Percentage distribution of state and local government DB plans, by counterfactual wealth ratio

Wealth ratio: ■ 0.85–0.89 ■ 0.90–0.94 ■ 0.95–0.99 ■ 1.00–1.04 ■ 1.05–1.09 ■ 1.10–1.14 ■ 1.15–1.19 ■ 1.20 or higher

4.6	10.8	27.7	7.7	15.4	3.1	16.9	13.9

SOURCE: Quinby, Aubry, and Munnell (2020, Chart 6).
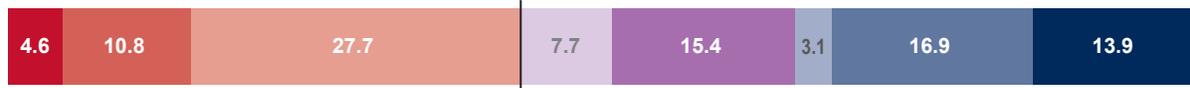
NOTE: Rounded components of percentage distribution do not sum to 100.0.

of the evaluated plans without Social Security coverage have a counterfactual wealth ratio less than 1, indicating insufficient generosity. Note that these calculations ignore the spousal and survivor benefits provided by Social Security; accounting for these auxiliary benefits would further reduce the counterfactual wealth ratio.

With that being said, the 2020 study also found that the percentage of plans that fall short of Social Security equivalency is sensitive to the career employment patterns of the noncovered employees.[7] Using stylized representations of state and local workers, the authors found that public-sector DB plans are most likely to fall short of Social Security equivalence for members who stay in their noncovered position for more than a few years but less than a full career. Specifically, 52 percent of the plans fall short of Social Security for a hypothetical worker who enters government employment at age 25 but spends only 12 years in government before leaving for the private sector.[8]

Work Patterns of Noncovered Workers

Quinby, Aubry, and Munnell (2020) provided a useful first look at whether benefits for noncovered workers meet federal standards and highlighted the importance of understanding the work patterns of state and local government employees to determine the relative risk for noncovered workers that retirement benefits may fall short of Social Security equivalence. This analysis draws on public-use data from three longitudinal surveys—the National Longitudinal Survey of Youth 1979 (NLSY79), the Panel Study of Income Dynamics (PSID), and the Health and Retirement Study (HRS)—and on records from the Social Security Administration's Continuous Work History Sample (CWHS), a large administrative database, to investigate the employment patterns of state and local government workers.

Data Sources

The Bureau of Labor Statistics conducts the NLSY79. The survey follows a nationally representative sample of individuals born in the period 1957–1964. The panel structure of the survey allows us to observe respondents continuously into their mid- to late 50s, but the results are noisy because of small sample sizes and self-reporting error. Further, the survey did not collect information on Social Security coverage until 2002.

The University of Michigan conducts the PSID. It tracks a representative sample of families and their descendants from 1968 to the present. Although the PSID follows many workers for much of their working lives, it also suffers from small sample sizes and reporting error, and likewise lacks information on Social Security coverage.[9]

The University of Michigan also conducts the HRS, which is sponsored by the National Institute on Aging and the Social Security Administration. The HRS is a longitudinal survey of multiple panels comprising respondents who were aged 51–61 when first interviewed (more recent panels were aged 51–56 in their first interviews). We use HRS results for individuals who were born in the period 1931–1965 and their spouses. The number of years that respondents worked in state or local government, as well as their Social Security coverage, can be determined from HRS questions about work history. However, these "recall" questions are particularly vulnerable to reporting error.[10] Moreover, the HRS did not ask state and local workers about their occupation before 2006.

The CWHS overcomes many of the limitations of the public-use survey data. It comprises a random 1-percent sample of all wage and salary workers. As such, it follows a large number of workers over their entire careers and has reliable data on Social Security coverage. Nevertheless, it has two weaknesses for this analysis. First, it did not record the sector (public

or private) of employment before 1981, so data on employment sector are missing for older individuals in the early parts of their careers. Second, the CWHS data do not identify the occupations of state or local government workers.

Because each data source has advantages and disadvantages, we synthesize results from all of them. Specifically, the analysis tracks the lifetime work experience of individuals aged 55 to 70 in 2016 (born 1946–1961) to determine the number of years that each worker spent in state or local government, and at what ages that employment occurred. In most instances, the different data sets yield similar conclusions. For example, Chart 4 shows that as of 2016, 21 percent to 36 percent of older workers had spent at least some of their career in a state or local government job.

How Long Do Noncovered Workers Stay in Government Employment?

Table 4 reports the percentage of nonfederal public-sector workers falling into each tenure group—short (5 or fewer years), medium (6–20 years), or long (21 years or more). Interestingly, the four data sources tell a similar story: Around one-third of workers leave their government jobs with 6–20 years of tenure. Roughly 45 percent of workers stay for only 5 or fewer years, and roughly 25 percent are career employees.[11]

Chart 4.
Percentage of workers aged 50 or older who had ever worked in state or local government as of 2016, by selected data source

Percent

Source	Percent
NLSY79	36
PSID	21
HRS	27
CWHS	31
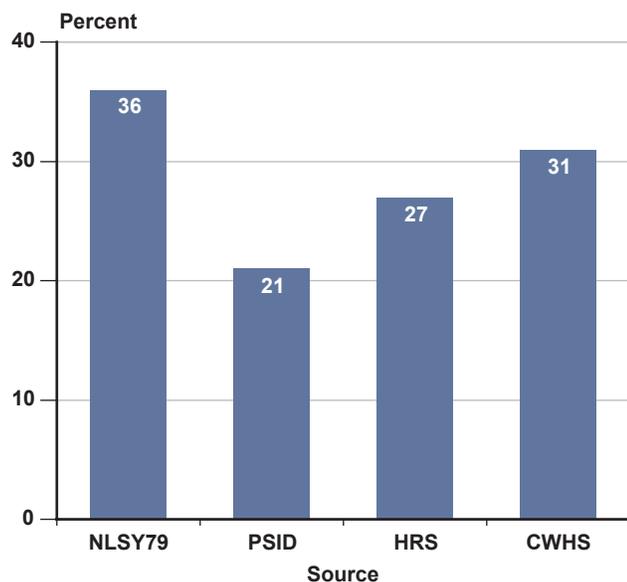
SOURCE: Authors' calculations based on sources shown.

Table 4 also shows the tenure distribution for covered and noncovered workers in the CWHS.[12] Noncovered workers tend to have longer tenures than their covered colleagues, but one outcome is consistent with that for state or local government workers overall: Around one-third of them leave their government jobs with 6–20 years of tenure.

When Does Government Employment Occur?

Because state and local government–provided DB plans typically determine benefits based on the pay in the employee's final years of work, the timing of government employment matters as well as the duration.[13] For workers who accrue medium-length tenures in state or local government employment that begins early in their careers, inflation erodes the eventual value of their pension benefits for decades, whereas those who spend the last years of their career in government employment enjoy benefits based on the average salary in the final years of their work lives. Hence, it is important to determine the typical age at which medium-tenure state and local workers start their government jobs.

Panel B of Table 4 shows the median entry age, by tenure, tabulated from the NLSY79, PSID, and HRS for state and local workers aged 55–70, regardless of coverage status.[14] Many workers enter government in their mid-20s or early 30s, implying that medium-tenure workers often leave government in their 40s, and will therefore receive pension benefits that have declined in real terms.

However, these median entry ages also imply that half of medium-tenure workers join the government in midlife and can retire from their government jobs with a substantial pension.[15] Panel C of Table 4 presents the share of all state and local workers who are still working in government after age 55, by total tenure.[16] As might be expected, the table shows that around half of medium-tenure workers are still in state and local government at older ages.

Panel A also shows the tenure patterns for three occupational groups of employees: teachers, public safety personnel, and all others.[17] Although pluralities of teachers and public safety workers stay longer in government, medium-tenure workers constitute around one-third of all three occupational groups.

Overall, the tenure analysis shows meaningful variation in the entry ages and tenures of state and local government employees, with significant minorities of them having public-sector employment early in their work lives and accruing medium-length tenures.

Table 4.
Selected characteristics of state and local government employees aged 55–70

Parameter	Job tenure		
	Short (5 years or fewer)	Medium (6–20 years)	Long (21 years or more)
	Panel A: Percentage distributions		
Data source			
NLSY79	54	30	16
PSID	48	31	21
HRS	33	37	30
CWHS	41	32	27
Social Security coverage (from CWHS)			
Covered	44	31	25
Noncovered	33	32	35
Occupational group and data source			
Teachers			
NLSY79	28	31	40
PSID	20	40	40
Public safety workers			
NLSY79	32	30	38
PSID	26	29	45
General government workers			
NLSY79	58	30	12
PSID	55	29	16
	Panel B: Median age on entering state or local government employment		
Data source			
NLSY79	22	25	23
PSID	37	35	27
HRS	29	38	25
	Panel C: Percentage of respondents employed in state or local government after age 55		
Data source			
PSID	12	41	73
HRS	20	47	69
CWHS	17	55	93

SOURCE: Authors' research based on sources shown.

NOTE: Rounded components of percentage distributions do not necessarily sum to 100.

Will Noncovered Workers Receive Social Security–Equivalent Benefits in Retirement?

To estimate the share of noncovered workers whose pension benefits will be equivalent to the Social Security benefits they would have received from covered employment requires a database of noncovered workers that adequately represents their distributions by job tenure, wage profile, and retirement-plan benefit formula. Because such a database does not exist, we constructed a synthetic population of noncovered workers based on data from various sources. This process involved four steps. The first step was to build a database of retirement plans for noncovered workers by occupational group and estimate the shares of noncovered workers whose plans use each type of benefit formula. The second step was to construct tenure archetypes for each occupational group and determine the shares of workers in each archetype. The third step was to link the constructed tenure archetypes to the appropriate benefit formulas and to apportion the noncovered workers with plans using each benefit formula to the archetypes. The fourth step was to generate wage profiles for each tenure archetype among workers whose retirement plans use a given benefit formula. Once the synthetic population was constructed, we proceeded to a fifth step: analyzing whether noncovered workers will receive Social Security–equivalent benefits throughout retirement. We describe each step—and the results of the analysis—in detail below.

Step 1: Construct a Database of Plan Benefit Formulas for Noncovered Workers

To build an occupation-specific database of noncovered workers by retirement-plan benefit formula, we expanded the sample of plans from the 2020 study to include several more DB plans for noncovered workers from the *Public Plans Database* (https://publicplansdata.org/) along with the largest plans for noncovered workers that are not traditional DB plans.[18] The expanded sample includes 55 traditional DB plans, seven stand-alone DC plans (of which two are for postsecondary educators only), three hybrid DB-DC plans, and one cash balance (CB) plan.[19] In 2020, these plans covered almost 8 million state and local government employees and more than $232 billion in annual earnings, representing about 80 percent of the noncovered state and local government workforce (Table 5).[20]

Similar to the 2020 study, this analysis focuses on recently hired workers because they are subject to the least generous pension benefit formulas and therefore face the greatest risk of receiving retirement benefits that fall short of Social Security equivalence (Aubry and Crawford 2017). In the wake of the 2008 financial crisis, most state and local government pension plans cut benefits for new hires. Data from pension plan actuarial valuation reports indicate that workers hired after 2010 accounted for about 45 percent of the state and local workforce by 2021 and will constitute nearly the entire workforce by 2037.

Table 5.
State and local government pension systems included in the analysis sample

State or local retirement system	Membership	Represented payroll (billion $)
Total	7,891,097	232.3
Plan includes some covered workers [a]		
Subtotal	1,004,819	28.4
California		
Public Employees' Retirement System	702,229	19.7
University of California Retirement Plan	10,362	0.5
Connecticut		
Municipal Employees' Retirement Fund	6,882	0.2
State Employees' Retirement System	38,243	1.4
Georgia		
Teachers' Retirement System	188,797	4.8
Illinois		
State Employees' Retirement System	5,626	0.2
Louisiana		
Parochial Employees' Retirement System	22,308	0.6
Texas		
Municipal Retirement System	30,371	1.0
Plan includes no covered workers [b]		
Subtotal	6,886,278	204.0
California		
City of Los Angeles—		
Employees' Retirement System	55,254	2.2
Fire and Police Pensions	27,155	1.6
Water and Power Employees Retirement Plan	21,340	1.1
Los Angeles County Employees Retirement Association	181,260	8.4
Orange County Employee Retirement System	47,197	2.0
State Teachers Retirement System	801,260	32.9

(Continued)

Table 5.
State and local government pension systems included in the analysis sample—*Continued*

State or local retirement system	Membership	Represented payroll (billion $)
Plan includes no covered workers [b] (cont.)		
Colorado		
Public Employees' Retirement Association—		
Denver Public Schools Division	24,815	0.7
Local Government Division	23,714	0.7
School Division	215,154	5.1
State Division	103,969	3.0
Connecticut		
Teachers Retirement Fund	90,234	4.3
District of Columbia		
Police Officers and Firefighters' Retirement Plan	9,366	0.5
Teachers' Retirement Plan	10,731	0.5
Florida		
City of Miami Fire Fighters' and Police Officers' Retirement	4,219	0.2
Georgia		
City of Atlanta—		
Fire (Sworn) Pension Fund	2,056	0.1
General Employees' Pension Fund	7,021	0.2
Police (Sworn) Pension Fund	3,439	0.1
Illinois		
City of Chicago—		
Firemen's Annuity and Benefit Fund	9,853	0.5
Municipal Employees' Annuity and Benefit Fund	76,440	1.8
Policemen's Annuity and Benefit Fund	27,831	1.2
Teachers Pension Fund	67,538	2.2
State Universities Retirement System	236,039	3.5
Teachers Retirement System	303,373	10.5
Iowa		
Municipal Fire and Police Retirement System	8,608	0.3
Kentucky		
Teachers' Retirement System	137,252	3.6
Louisiana		
City of Baton Rouge and Parish of East Baton Rouge Employees' Retirement System	6,766	0.1
Municipal Police Employees Retirement System	12,372	0.3
School Employees Retirement System	26,506	0.3
State Employees Retirement System	93,900	2.0
Teachers' Retirement System	175,681	4.1
Maine		
Public Employees Retirement System	84,535	2.0
Massachusetts		
Boston Retirement System	36,562	1.6
State Employees' Retirement System	156,846	6.4
Teachers' Retirement System	161,213	7.1
Michigan		
Detroit Police and Fire Retirement System	12,358	0.1
Missouri		
Public Schools Retirement System	154,973	4.8

(Continued)

Table 5.
State and local government pension systems included in the analysis sample—*Continued*

State or local retirement system	Membership	Represented payroll (billion $)
Plan includes no covered workers [b] *(cont.)*		
Nevada		
Police and Firefighters Retirement Fund	22,979	1.1
Public Employees' Retirement System	173,585	5.7
Ohio		
Cincinnati Retirement System	7,370	0.2
Police and Fire Pension Fund	63,203	2.3
Public Employees Retirement System	1,150,298	14.4
School Employees Retirement System	245,851	3.5
State Teachers' Retirement System	346,225	12.3
Oklahoma		
Firefighters Pension and Retirement System	9,825	0.3
Pennsylvania		
Pittsburgh Policemen's Relief and Pension Fund	3	0.1
Texas		
City of Houston—		
Firefighters' Relief and Retirement Fund	7,451	0.3
Police Officers' Pension System	9,819	0.5
Teacher Retirement System	1,427,734	47.4
Virginia		
Fairfax County Police Officer's Retirement System	2,663	0.1

SOURCE: Authors' research.

a. From 10 percent to 89 percent of plan members are also covered by Social Security.

b. Less than 10 percent of plan members are also covered by Social Security.

Unsurprisingly, the range of benefit formulas among the 55 DB plans (Table 6) is similar to that of plans sampled in the 2020 study and a related analysis (Springstead 2021). The maximum NRA in the DB plans is 67, which is the Social Security FRA for workers born after 1959. The average NRA for noncovered state and local government workers is substantially younger for public safety employees. Teachers and general government employees have average NRAs much closer to the Social Security FRA. The average vesting periods for noncovered general government and public safety employees are 7 years and 8 years, respectively. However, the maximum vesting period for these groups exceeds 10 years. Such a long period means that many medium-tenure workers may leave their state or local job before becoming vested. Benefit multipliers are typically more generous than the law requires. COLAs are provided regularly for more than 90 percent of noncovered public safety and general government pension beneficiaries but for only 35 percent of noncovered teachers.

The DC plans in the database (which were not included in the 2020 study) are not offered to public safety employees, whether or not they are covered for Social Security. The average combined employer and employee contribution rate is 15 percent of salary for noncovered teachers and 18 percent for noncovered general government employees. The minimum observed combined contribution rate is 13 percent, well above the federal requirement of 7.5 percent. For the one CB plan, the total contribution rate is 18 percent. In the DB portion of hybrid plans, NRAs and vesting periods are like those of the traditional DB plans, with public safety employees having much lower NRAs and general government employees having NRAs very close to the Social Security FRA. Unsurprisingly, the DC portions of hybrid plans allow lower contribution rates than the stand-alone DC plans do because the hybrid plans' DB portions augment the DC benefits.

Table 6.
Characteristics of retirement plans for noncovered state and local government workers, by occupational group and plan type, 2020

Benefit formula component	Teachers			Public safety workers			General government workers		
	Mean	Low	High	Mean	Low	High	Mean	Low	High
DB plans									
NRA (years)	63.8	55.0	67.0	57.0	49.0	67.0	65.8	55.0	67.0
Vesting period (years)	5.4	5.0	10.0	8.3	4.0	15.0	7.1	5.0	15.0
Benefit multiplier (%) if—									
FAS period = 1 year	. . .	. . .	. . .	2.7	2.5	3.0	. . .	. . .	. . .
FAS period = 2 years	2.0	2.0	2.0	2.0	2.0	2.0	. . .	. . .	. . .
FAS period = 3 years	2.1	1.5	2.5	2.2	2.0	3.0	2.3	1.5	2.5
FAS period = 5 years	2.3	1.8	2.5	2.1	1.5	3.0	2.3	2.2	3.0
FAS period = 6+ years	2.2	2.0	2.2	2.0	1.0	2.5	2.3	1.0	2.4
COLA (%)	1.8	1.0	2.4	2.2	1.0	3.0	2.2	1.0	3.0
Percentage of workers with—									
A COLA provision	34.8	0.0	100.0	94.3	0.0	100.0	92.9	0.0	100.0
A simple COLA	23.0	0.0	100.0	14.2	0.0	100.0	35.9	0.0	100.0
DC plans									
Contribution rate (%)	14.9	14.0	24.0	. . .	. . .	. . .	17.6	13.0	20.1
Vesting period (years)	2.3	2.0	5.0	. . .	. . .	. . .	4.6	0.0	5.0
Hybrid plans									
NRA (years)	60.0	60.0	60.0	50.0	50.0	50.0	65.6	65.0	67.0
DB plan vesting period (years)	5.0	5.0	5.0	10.0	10.0	10.0	8.6	5.0	10.0
Benefit multiplier (%) if—									
FAS period = 5 years	1.0	1.0	1.0	2.5	2.5	2.5	1.2	1.0	1.3
COLA (%)	. . .	. . .	. . .	2.0	2.0	2.0	2.1	2.0	2.4
Percentage of workers with—									
A COLA provision	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
A simple COLA	0.0	0.0	0.0	0.0	0.0	0.0	27.9	0.0	1.0
DC plan contribution rate (%)	12.0	12.0	12.0	2.0	2.0	2.0	4.2	2.0	10.0
DC plan vesting period (years)	0.0	0.0	0.0	3.0	3.0	3.0	2.2	0.0	3.0
CB plan									
Contribution rate (%)	. . .	. . .	. . .	. . .	. . .	. . .	18.0	18.0	18.0
Guaranteed interest rate (%)	. . .	. . .	. . .	. . .	. . .	. . .	5.0	5.0	5.0

SOURCE: Authors' estimates.

NOTES: Means are weighted by the share of noncovered workers with each benefit formula.

. . . = not applicable.

Step 2: Construct State and Local Government Employment Tenure Archetypes

We analyzed work-history characteristics and established four archetypes of state and local government tenure: short; medium, occurring either early or late in the worker's career; and long. Next, we constructed a prototypical work pattern for each type of tenure, specific to the worker's occupational group (Table 7). For example, medium-tenure teachers who teach early in their careers are presumed to enter the labor force as teachers at 23 (after college), leave teaching for work

in the private sector after 13 years, and then retire at age 58 after 35 years in the labor force.

In these archetypes, teachers and public safety workers are presumed to enter government employment in their early to mid-twenties—a bit sooner than workers in other government occupations, who are presumed to begin in their late twenties.[21] We assume that a short tenure in state or local government lasts 3 years, a medium tenure lasts 13 years, and a long tenure lasts at least 21 years. Tenure analysis using the CWHS suggested that workers with shorter tenures

Table 7.

Assumed characteristics of noncovered state and local government workers, by occupational group and government tenure archetype

| Characteristic | Short tenure | Medium tenure occurring— | | Long tenure |
		Early in career	Late in career	
Teachers				
Age at entering—				
Private sector employment	. . .	. . .	23	. . .
State or local government job	23	23	NRA minus 13	23
Tenure (years)	3	13	13	21
Years in labor force	30	35	35	35
Age at retirement	53	58	NRA	a
Percentage distribution	24	18	18	40
Public safety workers				
Age at entering—				
Private sector employment	20	20	20	. . .
State or local government job	25	25	NRA minus 13	20
Tenure (years)	3	13	13	21
Years in labor force	30	35	35	35
Age at retirement	50	55	NRA	a
Percentage distribution	29	15	15	42
General government workers				
Age at entering—				
Private sector employment	20	20	20	. . .
State or local government job	29	29	NRA minus 13	20
Tenure (years)	3	13	13	21
Years in labor force	30	35	35	35
Age at retirement	50	55	NRA	a
Percentage distribution	57	15	15	14

SOURCES: Authors' review of retirement plan features in plan actuarial valuation reports and tenure patterns calculated using data from NLSY79, PSID, HRS, and CWHS.

NOTES: Assumptions are based on a review of DB, hybrid DB-DC, and standalone DC plans. Assumptions for workers with hybrid plans are based on the DB portion of the plan. Assumptions for workers with standalone DC plans are based on the DB plans offered as alternatives by those workers' employers.

Teachers are assumed to finish college before entering the labor force. Public safety and general government workers may or may not have attained a bachelor's degree.

Rounded components of percentage distributions do not necessarily sum to 100.

. . . = not applicable.

a. The later of the NRA or the age at which the worker completes 21 years in government employment.

in government also have fewer total years in the labor force. Therefore, workers with short government tenure are presumed to spend about 30 years in the labor force overall, while those with medium or long government tenures are presumed to spend 35 years.[22]

Finally, we estimated the distributions of workers within each state and local government occupational group by tenure archetype. Overall, about one-third of workers in each occupational group are presumed to have medium tenures. However, about 57 percent of general-occupation employees are assumed to have short tenures, while about 40 percent of teachers and public safety workers are assumed to have long tenures. These assumptions are consistent with the results of the tenure analysis based on public-use survey data.

Step 3: Distribute the Archetypes Among the Appropriate Benefit Formulas

For each occupational group, we then placed the four tenure archetypes into the appropriate benefit formulas for each plan. Once the archetypes were placed, the total number of noncovered workers with each benefit formula was apportioned to the tenure archetypes based on the occupation-specific assumptions regarding the distribution of workers in each archetype. This approach produced a synthetic population of noncovered workers reflecting a realistic distribution of their tenure patterns (Table 8). For example, in our synthetic population, 22 percent of noncovered state and local government workers are teachers who are long-tenured and spend over 40 years teaching before exiting the labor force at age 64—the average

Table 8.
Mean values for selected characteristics of the synthetic population of noncovered state and local government workers, by occupational group and government tenure archetype

Characteristic	Short tenure	Medium tenure occurring—		Long tenure
		Early in career	Late in career	
Teachers				
Age at entering—				
Private sector employment	. . .	. . .	23	. . .
State or local government job	23	23	51	23
Tenure (years)	3	13	13	41
Years in labor force	30	35	41	41
Age at retirement	53	58	64	64
Percentage of noncovered workers	13	10	10	22
Public safety workers				
Age at entering—				
Private sector employment	20	20	20	20
State or local government job	25	25	44	20
Tenure (years)	3	13	13	37
Years in labor force	30	35	37	37
Age at retirement	50	55	57	57
Percentage of noncovered workers	2	1	1	3
General government workers				
Age at entering—				
Private sector employment	20	20	20	. . .
State or local government job	29	29	52	20
Tenure (years)	3	13	13	45
Years in labor force	30	35	45	45
Age at retirement	50	55	65	65
Percentage of noncovered workers	21	6	6	5

SOURCE: Authors' estimates. Synthetic population was constructed using data from plan actuarial valuation reports, NLSY79, PSID, HRS, and CWHS.

NOTE: . . . = not applicable.

NRA in plans for teachers. Similarly, 42 percent of public safety workers (or 3 percent of all noncovered workers) are long-tenured, but they exit the labor force at age 57 because plans for public safety workers tend to have younger NRAs. Finally, 57 percent of general-occupation employees (about 21 percent of all noncovered employees) are short-tenure workers who ultimately exit the labor force at age 50, which reflects the lower overall time in the labor force among those with short government tenures.

Step 4: Generate Wage Profiles

We generate realistic wage profiles for the synthetic population based on tenure-specific earnings trajectories estimated from the CWHS (Chart 5).[23] To produce the wage profiles for each archetype with a given benefit formula, the CWHS earnings trajectories are anchored to the actual government wages associated with that formula. For example, the complete wage profile for a medium-tenure early-career teacher in the Texas Teacher Retirement System (TRS) is anchored to the average teacher salary reported by Texas TRS for a teacher aged 23—the assumed age of entry to teaching.[24] From the age-of-entry starting point, earnings trajectories in the CWHS are used to estimate their wages at all other ages (including in private-sector employment).

Table 9 summarizes the wage profiles generated for the synthetic population. Teachers and public safety

employees have much higher real wages during their government tenure and throughout their careers than do general government employees. This disparity reflects the fact that average starting salaries for teachers and public safety workers are generally higher than those of other employees. Similarly, across all occupational groups, late-career medium-tenure workers tend to earn less than workers with other tenure types over the course of an entire career because the average starting government salary for a late-career worker is often lower than what an early-career employee would earn by that later age. In other words, state and local government salaries are typically more dependent on the worker's tenure in government than on age.

Step 5: Calculate Whether Noncovered Workers Receive Social Security–Equivalent Benefits

Completing steps 1 through 4 produces a synthetic population of noncovered workers that reflects their real-world distribution by pension benefit formula, government tenure, and wage profile. The next step is to use this synthetic population to investigate whether some noncovered workers receive pension benefits throughout retirement that fall short of what they would have received from Social Security had their job been covered.

We calculate a counterfactual wealth ratio for workers in each tenure archetype, occupational group, and

Chart 5.
Illustrative real-wage trajectories: Salary by age as a percentage of age-20 salary, for state or local government workers by length of government tenure
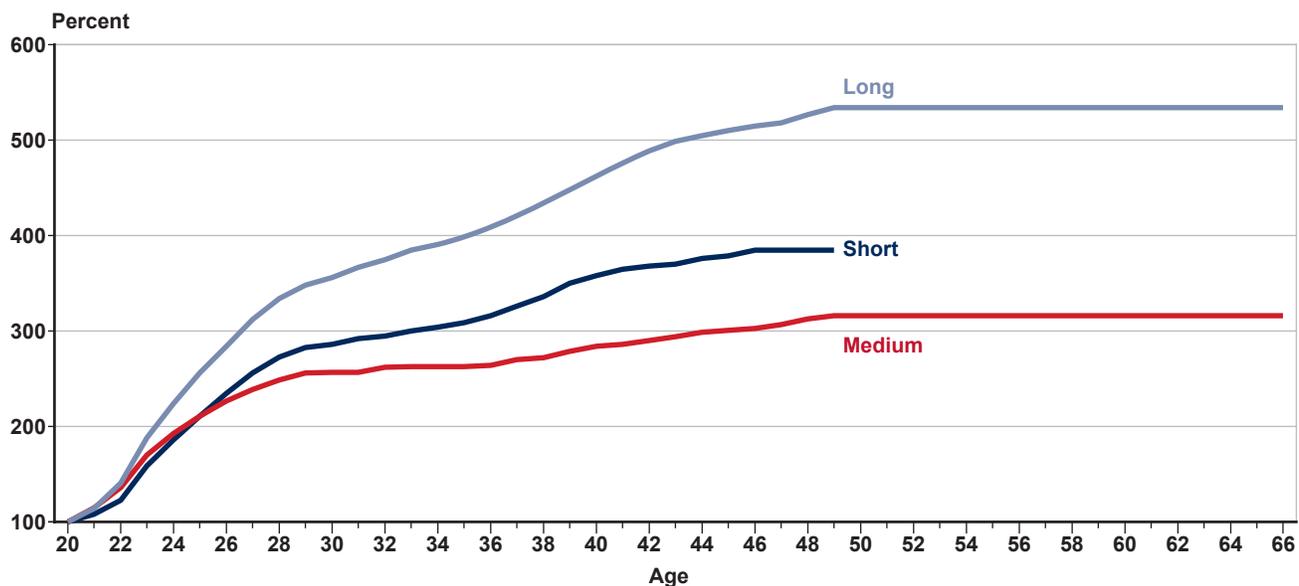
SOURCE: Authors' calculations based on CWHS.

Table 9.
Wage characteristics of a synthetic population of noncovered state and local government workers, by occupational group and government tenure archetype

Government tenure archetype	Workers as a percentage of all noncovered workers	Real wage		
		Average annual increase (%)	Average annual wage ($) in—	
			State and local government	Entire career
Teachers				
All	56.0	2.4	58,728	65,600
Short tenure	13.4	3.0	35,762	61,972
Medium tenure occurring—				
Early in career	10.1	1.8	46,210	53,642
Late in career	10.1	1.5	39,874	35,673
Long tenure	22.4	2.6	86,625	86,625
Public safety workers				
All	6.1	4.2	66,906	69,663
Short tenure	1.8	4.6	50,436	63,254
Medium tenure occurring—				
Early in career	0.9	3.3	54,420	56,189
Late in career	0.9	3.2	54,446	46,159
Long tenure	2.5	4.7	87,283	87,283
General government workers				
All	37.9	4.0	44,182	43,786
Short tenure	21.4	4.6	42,116	43,072
Medium tenure occurring—				
Early in career	5.6	3.3	39,270	38,260
Late in career	5.6	2.6	39,129	33,794
Long tenure	5.3	3.8	63,016	63,016

SOURCE: Authors' estimates. Synthetic population was constructed using data from plan actuarial valuation reports, NLSY79, PSID, HRS, and CWHS.

NOTE: Wages are in 2020 dollars.

retirement-plan benefit formula. For DB plan benefit formulas, the ratio[25] is:

$$\frac{Noncovered\ pension\ wealth + Covered\ Social\ Security\ wealth}{Counterfactual\ Social\ Security\ wealth}$$

The methodology for calculating the counterfactual wealth ratio for DC (or CB) plan benefit formulas is similar, except that the numerator includes the account balance of the state or local government plan at the time the worker reaches the Social Security FRA.[26] The nominal return on DC plan assets is assumed to be 4.7 percent, reflecting the intermediate-case assumptions in the 2021 Social Security *Trustees Report* (Board of Trustees 2021).[27] Thus, the ratio for DC/CB plan participants is:

$$\frac{Remaining\ noncovered\ DC/CB\ plan\ wealth +\ Covered\ Social\ Security\ wealth}{Counterfactual\ Social\ Security\ wealth}$$

For hybrid plan benefit formulas, the equation is:

$$\frac{Remaining\ noncovered\ DC\ plan\ wealth +\ Noncovered\ pension\ wealth + Covered\ Social\ Security\ wealth}{Counterfactual\ Social\ Security\ wealth}$$

To translate the results into population-level statistics, we weight them by the number of noncovered workers apportioned to each archetype with a given benefit formula. This final step results in an estimate of 53 percent of noncovered workers with a counterfactual wealth ratio of less than 1 (Table 10). However, more than two-thirds of these workers are short-tenure employees whose ratios are very close to 1. As mentioned in the 2020 study, workers with short tenures in noncovered employment should receive retirement income like that of the counterfactual—especially if they ultimately spend at least 35 years in covered employment. The fact that

Table 10.

Counterfactual wealth ratio characteristics of a synthetic population of noncovered state and local government workers, by occupational group and government tenure archetype

Government tenure archetype	Counterfactual wealth ratio				Percentage of workers with a counterfactual wealth ratio less than 1
	Mean	Standard deviation	Minimum	Maximum	
All noncovered workers	1.293	0.552	0.663	5.978	52.8
Teachers					
All	1.377	0.519	0.784	3.142	41.1
Short tenure	0.955	0.004	0.949	1.010	99.8
Medium tenure occurring—					
Early in career	0.872	0.051	0.784	1.130	93.0
Late in career	1.192	0.149	0.986	1.516	2.1
Long tenure	1.939	0.330	1.160	3.142	0.0
Public safety workers					
All	1.793	1.067	0.740	5.978	38.2
Short tenure	0.943	0.007	0.930	0.964	100.0
Medium tenure occurring—					
Early in career	1.035	0.168	0.742	1.739	47.6
Late in career	1.385	0.326	0.740	2.740	11.6
Long tenure	2.801	0.955	0.820	5.978	1.2
General government workers					
All	1.089	0.363	0.663	3.927	72.4
Short tenure	0.930	0.016	0.894	1.003	99.7
Medium tenure occurring—					
Early in career	0.851	0.090	0.663	1.277	97.3
Late in career	1.282	0.201	0.865	1.770	10.8
Long tenure	1.777	0.464	0.711	3.927	1.4

SOURCE: Authors' estimates. Synthetic population was constructed using data from plan actuarial valuation reports, NLSY79, PSID, HRS, and CWHS.

plan benefits for so many short-tenure workers fall slightly short of Social Security equivalence in the synthetic population is mostly a product of the specific work pattern of the short-tenure archetype based on the CWHS data noted earlier—specifically, that these workers spend less than 35 years in the labor force—rather than of pension plan benefit inadequacy.[28]

Medium- and long-tenure workers whose retirement income would fall short of Social Security equivalence represent about 16 percent of the synthetic population; most of these are medium-tenure early-career teachers and general government employees.[29] As such, the main takeaway from the population analysis is that a significant minority of the noncovered workforce is at risk of having less retirement income than they would have received from Social Security alone if they had spent their whole careers in covered employment. Ultimately, the less generous benefit provisions that were instituted for newer hires will apply to all

of the noncovered workforce, and this significant proportion could represent 750,000 to 1 million American workers annually.[30]

Conclusion

Analysis based on a synthetic population of noncovered state and local government workers confirms earlier results based on a sample of retirement plan benefit formulas: Workers with medium-length government tenures are at risk of receiving lifetime retirement income that falls short of Social Security equivalence. Given the distributions of the synthetic population of noncovered workers by occupation, retirement-plan benefit formula, and tenure in government employment, this translates to about 16 percent of all noncovered workers at risk of receiving less retirement income than they would have received from Social Security alone had they spent their whole careers in covered employment.

Although the share of workers with projected retirement benefits that fall short of Social Security equivalence is not large, the problem is serious. Social Security is intended to provide a *minimum* level of retirement income for all Americans. Covered public-sector workers and many private-sector workers augment their Social Security benefits with employer-sponsored retirement plans. The concern is that pension benefits ultimately will not meet that minimum level for 750,000 to 1 million noncovered workers annually who cannot augment those benefits with Social Security income.

Notes

[1] Estimates of the number of noncovered state and local government workers vary depending on the data source and definition of employment. The Social Security Administration's (SSA's) Employer-Employee File indicates that about 23.1 million workers had at least *some* annual earnings from state and local government employment in 2018, with 6.6 million (28 percent) of them having noncovered earnings. An agency briefing paper (SSA 2021) uses administrative data to estimate that about 17.9 million workers derived *most* of their annual earnings from state or local government employment each year in the period 2014–2018, with 4.7 million (26 percent) of them having noncovered earnings. The briefing paper also cites the Census Bureau's Annual Survey of Public Employment & Payroll, which reports 19.6 million state and local workers overall as of March 2018. That figure would presumably yield yet another estimated number of noncovered workers.

[2] Public-sector pension plans' long-term investment returns are slightly below expectations, despite strong gains in 2021. Specifically, plans for both covered and noncovered workers have underperformed their expectations by about 1 percentage point since 2001, even though the returns since 2010—that is, after the global financial crisis of 2008–2009—exceeded expectations by more than 2 percentage points (Aubry, Quinby, and Wandrei 2021).

[3] The surveys focused on large state-administered retirement systems identified as representing the bulk of noncovered state and local government payrolls in Government Accountability Office (2010).

[4] For DC plans, the median total contribution rate (employer plus employee) was 18 percent of salary and the sample minimum was 10 percent, well above the Safe Harbor contribution requirement of 7.5 percent.

[5] The hypothetical worker was assumed to enter government employment at age 35 (in 2028) with a $50,000 starting salary and then to experience 3.8 percent wage increases annually.

[6] Vesting periods in noncovered state and local government pensions are long relative to private-sector DC plans (the most common type of private-sector plan).

[7] Interestingly, the distribution of counterfactual wealth ratios did not appear to be sensitive to realistic variation in earnings levels.

[8] The analysis also found that new hires who spend only 5 years in government employment accrue benefits at least as valuable as those they would have accrued in a career covered by Social Security if they spend at least 35 years in covered private-sector employment. Prior analyses of the actuarial assumptions used by state and local government pension plans suggest that about 45 percent of new hires spend less than 5 years in state and local employment (Munnell and others 2012a, 2012b; Quinby and Wettstein 2019).

[9] Both the NLSY79 and PSID include data for the respondents' spouses, but because those data are less reliable, we limited our analysis to results for respondents. Further, there are no data for the early working years of older PSID respondents whose careers started before 1968.

[10] For example, workers with brief stints in state or local government may not bother to report them.

[11] These results align with those in Munnell and others (2012b), who conduct a similar exercise for younger cohorts of workers using the data published in public-sector pension plan actuarial valuation reports.

[12] Recall that the CWHS is the most reliable source of data on Social Security coverage.

[13] Basing retirement benefits on the salary received in the final years of employment is common to virtually all DB plans in the United States, whether provided by state- and local-government, private-sector, or federal-government employers.

[14] This analysis does not distinguish between covered and noncovered workers because, as noted earlier, the public-use survey data do not provide that detail and the CWHS lacks early-career employment data for the older cohorts in our analysis.

[15] Moreover, the CWHS data show that approximately 45 percent of medium-tenure workers have more than one stint in state and local government employment.

[16] For consistency with panel B, this analysis includes both covered and noncovered workers. The NLSY79 is excluded from this analysis because its sample size is small for the targeted age group.

[17] This phase of the analysis relies on the NLSY79 and PSID, because the HRS and CWHS do not contain sufficiently detailed occupational information. Thus, it does

not distinguish between covered and noncovered state and local government workers. Because some workers switch public-sector occupations—and Social Security coverage is based on an employee's occupation and/or job tenure—we classify workers by the occupational category in which they spend the most working years.

[18] Details on the occupation-specific benefit formulas used in plans for noncovered government employees come from the plans' actuarial valuation reports, websites, and benefit handbooks. The number of noncovered workers whose plans use each benefit formula is based on data from actuarial valuation reports and the Census Bureau's Census of Governments.

[19] Although our sample excludes 5 small DB plans that were included in the sample of the 2020 study, we added other plans, resulting in a net increase in plans and noncovered workers analyzed.

[20] The 80 percent figure is based on Government Accountability Office (2010), which estimated total noncovered state and local government workers' earnings of about $213 billion in 2007; we estimate that noncovered earnings for the sample of plans in this analysis was about $175 billion at that time.

[21] Interestingly, the public-use survey data we reviewed suggested that most early-career government workers enter government employment at age 29. However, because these data sets are heavily weighted toward employees in general government occupations, early-career teachers and public safety workers are presumed to enter government employment at younger ages.

[22] For analytical tractability, we assume that all time out of the labor force occurs at the beginning of the career (for example, to pursue education) and end of the career (for example, early retirement), rather than sporadically during the career (for example, childrearing or unemployment).

[23] We use the CWHS to estimate real wage growth by tracing median annual earnings (in consumer price index–adjusted 2020 dollars) over the life cycle for workers in each tenure category. Because of data limitations in the full CWHS, we focus on workers born 1958–1961. We also omit workers with zero annual earnings from the calculation of the median at each age. To check whether data for workers with different earnings levels entering and exiting the labor force over the life cycle biased the results, we also looked at individual earnings growth by age. The real growth rates from that analysis were qualitatively similar to those of the main analysis, but noisier.

[24] If the retirement plan does not provide occupation-specific salary information by age, we use the total average salaries for the occupational group instead. The total average salary by occupational group is based on data in either the plan actuarial valuation report or in the Census of Governments for all governments that participate in the plan.

[25] The economic and mortality assumptions needed to estimate future benefits follow the intermediate-case assumptions of the 2021 Social Security *Trustees Report* (Board of Trustees 2021).

[26] We assume that workers who retire prior to their Social Security FRA use their DC plan assets to support themselves until they reach their FRA. Short- and medium-tenure workers—who are assumed to be eligible for Social Security—draw down annual amounts equal to the expected Social Security benefit at their FRA. Long-tenure workers—who are assumed not to be eligible for Social Security—draw down annual amounts sufficient to completely self-annuitize their DC plan wealth over retirement. If the draw-down for short-, medium-, or long-tenure workers results in DC plan assets being exhausted prior to the FRA, DC plan wealth in the counterfactual ratio is equal to zero.

[27] We assume that workers invest a portion of their DC plan savings in risky assets.

[28] Because short-tenure workers in the synthetic population spend only 3 years in government employment, they are unlikely to have become vested in a DB pension before they leave state and local positions. Among short-tenure workers who are presumed to spend 35 years in covered employment, no teachers and very few public safety and general government workers would have retirement income that falls short of Social Security equivalency.

[29] For medium-tenure workers, 60 percent of the retirement plans fall short of Social Security equivalency—consistent with the finding of 52 percent in the 2020 study. In both this analysis and the 2020 study, the plans that do not fall short are predominantly for public safety workers.

[30] From 2000 to the onset of the COVID-19 pandemic, state and local government employment increased by roughly 0.5 percent per year. If employment returns to prepandemic levels by 2023 and then rises by 0.5 percent annually for the following 15 years, the noncovered workforce will consist of slightly more than 5 million workers, of whom about one-sixth will be subject to the less-generous plan provisions by 2038.

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